Chapter

10

WEATHER DATA NETWORK

Introduction

Individual AWOS reports broadcast to pilots en route or accessed by direct dial-up (synthesized voice message or computer modem) are one of the primary benefits of this weather observing system. Its utilization can be increased multifold if the data can be acquired and disseminated by other means to a wide range of potential users. These users represent other transportation modes, emergency response operations, State agencies including tourism centers, federal and other state agencies, and the general public. The need for reliable, near real-time data is evident throughout societal functions and has a value that varies depending on the user's specific needs (refer to related responses in Appendices B, C, D and E). This chapter seeks to identify a potential conceptual network for the acquisition and dissemination of the AWOS data.

Conceptual Network

The operating and performance specifications of federally-certified AWOS units provide for the potential to acquire the weather data on an automatic basis. The FAA is currently finalizing its networking of AWOS-3 units installed under the Facilities and Equipment Program. The network is the AWOS data acquisition system (ADAS) and relies on the use of leased telephone lines to connect each federally-installed and maintained AWOS with its associated air route traffic control center (ARTCC). The center has the gateway to transfer this information to the national data interchange network (NADIN) where it is routed throughout the FAA and NWS data systems and worldwide. There is the potential for non-federal AWOS units to be linked to ADAS, however, the existing capacity of the system cannot accommodate large numbers of such connections. Further, the owner of each connecting AWOS would be responsible for the telephone communications cost and 24-hour monitoring and control to ensure the correct functioning of the connection including resolution of transmission anomalies.

Alternative means to acquire and disseminate AWOS data are available and in application today. One network concept available from two commercial vendors essentially involves the uplink of the weather report to a satellite for downlink to a central location and direct input to NADIN. The installation of other facilities at the AWOS site, or terminal building, enables the receipt of data within NADIN as well as value-added products and services offered by the vendor. Such products include weather satellite imagery (as received from linkages to federal weather satellite networks), weather condition mapping and flight plan filing services. This alternative represents a decentralized solution at the state level.

A second primary means to network the AWOS data relies on the use of available telecommunications facilities owned/leased by the State to establish a link to NADIN for the two-way flow of weather data from a central location. This approach is presently in application today in Iowa and is referred to as the Iowa Aviation Weather System. Within Arizona, the implementation of Project EAGLE in conjunction with TRANSNET (refer to Chapter 2, Communications Facilities), would provide the backbone for an AWOS data network. Each AWOS can be linked to the nearest node on the TRANSNET or as provided through Project EAGLE. The connection is by local telephone line or a radio data link capability where viable. The latter eliminates monthly telephone line access charges. The AWOS data would then be routed to a central host computer for storage and further dissemination including a linkage to NADIN. Weather data and products available on NADIN would flow to the host computer and then be disseminated through the TRANSNET and Project EAGLE facilities to the end user.

Recommended AWOS Network Topology

The basic options to network the weather data described above represent a decentralized versus centralized approach. Inasmuch as the State is able to provide a high capacity backbone telecommunications network through Project EAGLE and TRANSNET, there will not be a need to rely on third-party services to collect the AWOS data in a decentralized fashion. Because the amount of data transmitted from the AWOS is relatively small (on the order of 2,000 bytes) its demand on the telecommunications network is minimal. The AWOS units to be networked are the 30 AWOS-3 units recommended in Chapter 7. AWOS-A facilities are not required to be networked and their limited data is not eligible for transmission to NADIN.

Under the centralized weather data network concept, each AWOS-3 installed under a State/local program would be linked to TRANSNET or Project EAGLE facilities and routed to a stand-alone, multi-user multi-tasking application server. This server (computer) could be sited at any location on the TRANSNET, but preferably one which is equipped and staffed to manage the TRANSNET. For

purposes of this study, this location is referred to as the Weather Center. Weather data received would be stored in an appropriate database and be available to all users over the TRANSNET frame relay network. This database could be maintained on the server itself or could operate as a separate application running on another stand-alone personal computer (PC). This network approach confirms the appropriateness of the Arizona DOT's earlier long-range communications plan which yielded TRANSNET and the State's implementation of Project EAGLE.

The Weather Center could be equipped and staffed to create value-added products and services from the AWOS data collected and other weather data sources to a wide range of users including aviation interests. The extent of such commitment is dependent on the desire or need to consolidate weather data collection efforts undertaken by multiple State agencies into a single operating/service center.

Facilities at the Weather Center would be accessed to transmit the latest received AWOS report to NADIN. Presently, the allowable frequency of update is every 20 minutes unless a weather condition of certain magnitude triggers the identification of a special weather report. There are basically two options to accomplish the linkage to NADIN. The first envisions that the State would develop the interface and take responsibility for the connection in conformance with federal standards and requirements. The second option would have this responsibility assigned to a third-party. The latter is the preferred option inasmuch as weather data vendors have developed this capability and can provide the service, including the monitoring of the data content and its transmission, and assume the responsibility for such activity.

Access to weather data contained on NADIN circuits can be facilitated at the Weather Center for dissemination to airports. This will require the installation of a PC at each airport location and, where more than one fixed base operator provides services to pilots, potentially multiple PCs. Users of these PCs could be linked to TRANSNET via a local telephone line and thereby gain access to the Weather Center. Alternatively, these PCs could be linked to DUATS or its replacement service as part of the FAA OASIS program to acquire NADIN data and the value-added services offered by the DUATS/OASIS providers.

Because private industry access to TRANSNET is not a likely option for security and other reasons, the PC to DUATS/OASIS linkage is recommended. This linkage will enable access to federal ASOS and AWOS-3 data which otherwise could not be obtained through linkages to TRANSNET. The provision of the PCs at the airports could be a State responsibility or that of each participating fixed base operator. The latter is preferred inasmuch as it limits the State's

involvement and encourages private investment and an element of competition. The State should specify minimum operating and performance standards for the PCs and can explore the potential of acquiring the units in bulk purchase to take advantage of lower unit costs and seek reimbursement from the operators.

The Weather Center also serves as the gateway to disseminate raw and value-added weather products and services. One increasingly popular means would be through the Internet and the Arizona home page. Conversely, linkages to weather data sources such as the FAA, NWS and other state aviation/transportation departments should be concentrated at the Weather Center. This data inflow will aid in the preparation of value-added weather products and services should the State elect to pursue such activity.

The recommended topology for the AWOS Weather Network is illustrated in Figure 10-1. This network is presented in a conceptual format that reflects the use of currently available technology and programmed telecommunications system improvements within Arizona. It serves as a springboard from which further study and detailed design of system integration can be initiated.

Figure 10-1

AWOS WEATHER NETWORK CONCEPT